

## Chapter Five • Natural Resources and the Environment





## Chapter 5

# Natural Resources and the Environment

### Introduction

One of the qualities that makes the City of Falls Church a pleasant and healthy place to live is the City's continuing commitment to the preservation and renewal of its natural resources. Cooperation among City residents, government, and businesses has long been recognized as fundamental to natural resources protection and preservation, and the City has operated on the premise that environmental preservation and economic vitality are compatible. This recognition helped the City to protect its natural resources, in particular, its tree cover, in the face of rapid suburbanization after World War II.

Geology, topography, soils, groundwater, surface water, floodplains, air, and trees are all vital resources to the City, and the best way to manage these resources is to recognize their interdependence and approach them comprehensively. This Plan addresses the City's natural resources in a comprehensive manner within this chapter.

A variety of citizens groups, including appointed groups such as the Tree Commission and Environmental Services Council, as well as non-appointed groups such as the Village Preservation and Improvement Society, the League of Women Voters, and the Stream Stewards program participants are active within the City and work to safeguard and enhance the environment. Programs like the Neighborhood Tree and Stream Stewards, have been very successful and have built a strong coalition of citizens dedicated to the preservation of trees and the city's streams and watershed.

In addition, the City has adopted a number of ordinances including the Chesapeake Bay Preservation Ordinance, the Erosion and Sediment Control Ordinance, the Floodplain Ordinance, the Landscape Ordinance, and the Tree, Shrub, and Weed Ordinance, all of which are designed to protect the environment by encouraging well-planned development, protect sensitive natural resources, and enhance public awareness.

This chapter contains, in addition to a natural resources inventory, a summary of City ordinances that provide the tools for natural resources protection, an inventory of constraints on development posed by sensitive and protected natural resources, and an inventory of existing and potential sources of pollution. The chapter concludes with a discussion of natural resources trends and goals and strategies related to future City efforts to protect and enhance the environment.

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## Natural Features Inventory and Impacts of Urbanization

Often in an urban environment, natural features can be overlooked. Therefore, it is important to become aware of those resources and practical methods for preserving them during the City's redevelopment process. Good planning prescribes that, when possible, development should be planned to avoid sensitive environmental features. By understanding the natural characteristics of the City and the challenges that they present to development, the environmental quality of Falls Church can be preserved.

The following section provides a summary of natural resources and environmental features that are unique to the City of Falls Church, as well as those which are shared with its Northern Virginia neighbors, how these features are impacted by development, and a discussion of how these features can be preserved during the City's redevelopment process. Features covered in this section include topography, geology and soils, surface water resources and watersheds, groundwater resources, wetlands, natural habitats, and urban tree cover.

### *Topography*

The topography of the City consists primarily of gentle to undulating slopes with elevations ranging from 280 feet above sea-level where Tripps Run and Four Mile Run exit the City limits, to slightly more than 430 feet above sea-level where the City line cuts across Prout Hill in the Virginia Forest subdivision. Steeper slopes are found along many stream banks and on hillsides in some areas. Tripps Run and Four Mile Run form two well defined valleys that traverse the City roughly from the northwest to the southeast. A series of hills and ridges separate the valleys between Broad Street and Great Falls Street. Smaller tributaries, many of which are now piped and therefore not readily visible, branch out from Tripps Run and Four Mile Run, cutting smaller valleys and ridges into the landscape.

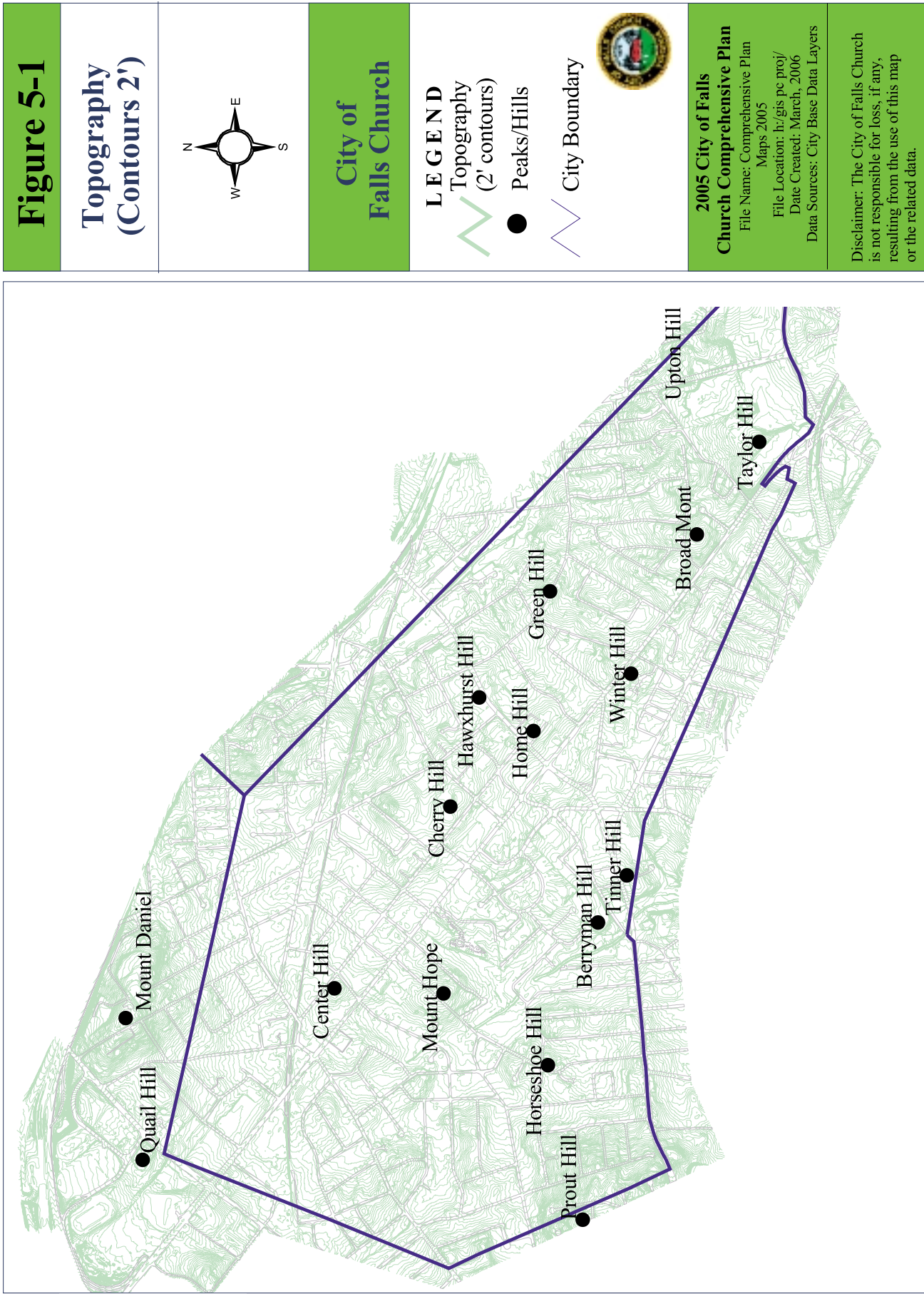
Topography once played a significant role in identifying where one lived within the City. Many of the oldest place names in Falls Church are associated with its hills. While most residents of Falls Church now identify themselves with a modern street or subdivision in which they live, most of the hills in Falls Church have names that reflect the City's 300 year history and before. The oldest-named hill in Falls Church is Green Hill, which was originally translated from the native American Algonquin language of the area. The second oldest-named hill is Winter Hill, which was named prior to the Revolutionary War. Taylor Hill is named for Fort Taylor and Taylor Tavern, which were built during the Civil War. Other hills within the City are

named for, or were named by, important City residents who lived there. Many of the highest peaks are located outside of the City with the bases being located within the City. The three highest peaks include Mt. Daniel to the north, Prout Hill to the west (the base of which is known as Horseshoe Hill within the City), and Taylor Hill in the eastern portion of the City. Other hills that are located either partially or totally within the City include Center Hill, Mount Hope, Cherry Hill, Hawxhurst Hill, Home Hill, Berryman Hill, and Tinner Hill. **Figure 5-1** presents the topography of the City and the location of the named hills. Upton Hill is located just outside of the City's boundary in Arlington County. The two primary valleys are Four Mile Run and Tripps Run with both low points located just east and south of the City's boundary. Other valleys include those of the Four Mile Run and Tripps Run tributaries – Sewell, Reagan, Church, Brice, Henderson, Gundry, Coe, Ellison, Pearson, Parker, Grove, Trammel, Osborne, Crossman, Harrison, Wren, Ives, and Robertson.

Development within areas that are steeply graded can be problematic causing increased stormwater flow to lower lying areas and erosion if the soils are not stabilized. Poorly designed and constructed developments on steep slopes frequently result in substantial costs to the public, either for repairs or for protective measures to prevent further damage. Increased runoff and sedimentation from denuded hillsides require increased public expenditures for flood control and stormwater management. Further, improperly planned development of hillsides affects the equilibrium of vegetation, geology, slope, and soil. While the City of Falls Church is largely built out, any redevelopment or infill development within the City must take topographic constraints into consideration for the reasons discussed below.

Steep slopes in excess of 15 percent and slopes located along streams are susceptible to erosion. Therefore, particular care must be taken when planning to develop a site with these characteristics. In some instances, special engineering may be required to stabilize slopes. Where redevelopment is to occur in a degraded hillside area, restoration of the damaged area is important to ensure the structural stability of the redevelopment. In addition, hillside restoration results in an improvement in aesthetics and local water quality. While the City does not currently have a separate hillside protection or restoration ordinance, the Chesapeake Bay Preservation Ordinance provides a means for the City to claim very steep slopes as sensitive areas and to work with developers during the development or redevelopment process to restore damaged hillsides.





### *Geology and Soils Characteristics*

Geology and soils features are important not only from an ecological perspective, but also from an economic perspective. By steering development away from sensitive areas, the City of Falls Church can avoid future costs to taxpayers from correcting damage to the ecology and to water quality, and personal property.

#### **Geology**

The City of Falls Church is situated within the Piedmont physiographic province. The Piedmont consists primarily of the fragments of other continents or of ocean crust that were swept up and plastered onto the North American continent in the process of plate collisions and separations. As a result, the Piedmont is enormously complex with highly folded and intricately sliced metamorphic and igneous rock formations.

With the exception of the floodplains immediately surrounding Tripps Run and Four Mile Run and some residual Coastal Plain sediments, the geologic strata underlying Falls Church consists of crystalline rock and saprolite (highly weathered rock). Approximately two-thirds of the City consists of metamorphic rock including gneiss, schist, and metagraywacke. The southwestern portion of the City is dominated by an igneous mass of granatoid rock. In both areas, the saprolite is greater than three meters thick above the bedrock. Areas along Tripps Run and Four Mile Run are underlain by non-consolidated alluvial materials associated with floodplains and valley fill. Non-consolidated alluvial materials consist primarily of sands, silt, clay, and gravels transported and deposited by streams. In addition to these three predominant geologic features, small outcrops of upland gravel, consisting of pebbles and cobbles left from older Coastal Plain deposits that have been eroded away elsewhere, occupy some of the higher points within the City. To the west, these residual deposits form the highest natural elevation in Fairfax County at Tysons Corner. A small outcrop of mafic rock, which is dark, dense rock commonly known as greenstone, occurs in a small wedge in the western portion of the City straddling West Broad Street.

#### **Soils**

Soils serve as the lifeblood of the ecology as well as the most basic building material for roadways, embankments, and building foundations. They result from the breakdown of the underlying bedrock by weathering processes. In the City of Falls Church, management of soils is important to ensure that development does not result in erosion and sedimentation that will clog local streams and destroy ecological habitats. Areas consisting of shrink-swell clays, highly permeable and erodible soils,

hydric soils, low depth to groundwater, wetness, and a number of other sensitive soil characteristics also require special consideration in an urban environment. In addition to development considerations, soil characteristics have an effect upon the types of indigenous vegetation that thrive in the City.

There has been no detailed soils study of the City since 1915 with the publication of the US Department of Agriculture's Soils Map of Fairfax and Alexandria Counties. However, the "Soils Survey of Fairfax County, Virginia," published in 1963 indicates general soils associations found within the City. Most soils within the City have been permanently altered or disturbed by development; therefore, while general observations are possible, site specific soil tests are necessary for development and engineering purposes. It is also important to note that

with the exception of areas underlain by mafic rocks and floodplains, most areas of the City are generally suitable for development purposes as long as sites are properly engineered.

Appling soils, which make up most of the Appling-Louisburg-Colfax association, are found in the eastern portion of the City and are favorable for most engineering characteristics. However, the less hilly areas of Louisburg soils are also suitable as material for housing developments, while Colfax soils are poor materials for housing developments and many types of construction. The Appling-Louisburg-Colfax association is largely a product of the crystalline rock of the Piedmont upland. The association is light colored, coarse-textured soils over granite gneiss with drainage characteristics from poor to excessive. The terrain is mostly rolling, hilly, and steep relief with plentiful springs.

Fairfax and Beltsville soils make up 80 percent of the Fairfax-Beltsville-Glenelg association which is predominant in the western portion of the City and are mostly moderately well drained. Fairfax and Glenelg soils are considered good for roadbeds while Beltsville soils are considered poor for this purpose. As with the Appling-Louisburg-Colfax association, springs are plentiful.

Soils found in the stream valleys of the City consist of mixed alluvium and are highly subject to frequent flooding. Soils associated with floodplains within the City tend to have high water table and variable shrink-swell potential. These soils are subject to flooding and are generally unsuitable for development.

Other common constraints placed by geologic conditions or sensitive soils include, but are not limited to, hydric conditions, high shrink-swell potential, wetness, flooding potential, depth to bedrock, and high water table. Proper management of soils will help maintain



clean water and will provide areas to recharge groundwater. However, poor management of soils will choke local waterways with silt and sediments and result in the erosion of valuable topsoil as well as spoil the landscape.

It is difficult to overemphasize the importance of geology and soils characteristics when planning development and redevelopment within the City. Consideration of geology and soils should be utilized to guide development away from sensitive or unstable areas in order to protect the safety of residents, ensure the structural soundness of buildings, and protect the water quality of Four Mile Run, Tripps Run, and eventually the Potomac River and the Chesapeake Bay. In order to consider these features during the redevelopment process, the City must work to have a soil identification map created as well as a groundwater profile map. If this study cannot be conducted, soil identification must be conducted at the time of development or redevelopment.

### *Wildlife Habitat*

Falls Church is one of the oldest developed areas of Northern Virginia. Much of the indigenous vegetation was cleared during construction and many of the original woodlands have been replaced by lawns and low brush. However, parcels of open and undeveloped land, utility line rights-of-way, and stream valleys, in combination with suitable forms of development, have resulted in a limited wildlife habitat known to ecologists as "typical suburban." Many spot surveys of the wildlife habitat of the City have been conducted and provide a picture of its overall ecology. While the City has maintained a good urban tree cover and enough parks and open space to provide habitat to many terrestrial animals and birds, the bulk of the City's wildlife habitat is located along the green corridors associated with Tripps Run and Four Mile Run.

Remains of the Piedmont oak-hickory forests are found in many areas with dominant species including red, white, and black oaks. Deer sightings are still occasionally reported, but available habitat in the watershed is too limited for large animals. Beavers and otters that are still found in areas to the south in Fairfax County are for the most part absent in the City of Falls Church. Foxes and raccoons are quite abundant, even in the most developed portions of the watershed. Other animals that are commonly observed in the Cameron Run watershed include opossums, shrews, moles, bats, eastern cottontails, squirrels, chipmunks, woodchuck, voles, muskrats, rats, mice, red and gray fox, raccoons, skunks, and long-tailed weasels.

In addition to terrestrial and aquatic wildlife, many species of birds may be found in the City during different times of the year. Many of these are song birds which provide a pleasant diversion from the usual urban sights and

sounds. The most common birds that are known or presumed to breed in and/or around the City of Falls Church include species of hawk, bobwhite, dove, cuckoo, owl, swift, woodpecker, wood-pewee, pheobe, fly catcher, king bird, purple martin, blue jay, fish crow, tufted titmouse, gnatcatcher, robin, nuthatch, mockingbird, waxwing, starling, warbler, common yellowthroat, cardinal, sparrow, blackbird, cowbird, oriole, finch, mallard, hummingbird, flicker, swallow, crow, chickadee, wren, bluebird, wood thrush, catbird, thrasher, vireo, ovenbird, redstart, chat, tanager, bunting, towhee, grackle, and goldfinch. Many other species are known to traverse the City at different times.

The Virginia Department of Conservation and Recreation, Division of Natural Heritage (DNH), maintains records on the general location and occurrence of endangered species of wildlife or vegetation for planning purposes in Northern Virginia. According to the DNH, there are no records of endangered species or other natural heritage resources in or bordering the City. This does not necessarily mean that other natural heritage resources do not occur in Falls Church, but that the DNH records do not currently contain information to document their presence. Since the DNH's biological and Conservation Data System is constantly growing and revised, the City should periodically contact the DNH for updated information.



### *Trees*

One of the City's most attractive features is its extensive urban tree cover. A report in February of 2002 by American Forests titled "Urban Ecosystem Analysis for the Washington, D.C. Metropolitan Area" stated that the City of Falls Church has an average of 53% tree canopy coverage that is only second to McLean, with 59 percent tree canopy coverage, in the Northern Virginia Region. Surrounding jurisdictions have approximately 30-40 percent coverage with Washington, D.C. having only 22 percent coverage. The same study estimates a dollar value of the function of the urban canopy. The economical value

of the City of Falls Church tree canopy is estimated at \$179,000 in filtering air pollutants and \$7.7 million in storm water control.

From efforts to enhance commercial areas with street trees and landscaping to promoting the development of the community's forest on both public and private lands, the City has displayed that trees are vital to the preservation and improvement of the quality of life, and that trees are one of its most valued natural resources. The preservation and establishment of trees not only provides a valuable and attractive natural resource, but they are also a cornerstone for sound water and soil management. The City recognizes that trees (1) add beauty and composure to the urban world by softening harsh lines and furnishing color; (2) break the expanse of view; (3) improve air quality by trapping and holding dust particles that can damage human lungs, by absorbing carbon dioxide and other polluting gases, and by replenishing the atmosphere with oxygen; (4) save energy through cooling summer air temperatures and serving as windbreaks during winter; (5) reduce noise pollution by absorbing loud sounds from the urban environment; (6) increase economic stability and viability by attracting business customers and commercial renters to the community; (7) improve personal health by helping to cleanse polluted natural features and to relieve psychological stresses associated with urban living; (8) improve water quality by reducing rainwater runoff and erosion, recharging the groundwater supply, and preventing the transport of sediment, chemicals, and litter into streams; and (9) create desirable wildlife diversity in the urban ecosystem by providing habitat for birds that would otherwise be absent from the urban area. A wide diversity of native species, sizes, and ages of trees are desirable characteristics.

In 1892 the Village Society established the City's first Arbor Day on the grounds of the first public school - The Jefferson Institute. This was the first celebration of Arbor Day in the State of Virginia. Recognizing the value of trees to the community, the City has in recent years enacted a Tree Ordinance, Landscape Ordinance, and a vegetative component of the Chesapeake Bay Preservation Overlay District, established a Tree Commission, and appointed a City Arborist and Urban Forestry Unit.

In acknowledgment of its efforts to preserve and maintain its trees, Falls Church has met the criteria of the National Arbor Day Federation to be certified and designated a "Tree City – USA" every year since 1978. In 2003 the city received its first "Growth Award" that recognizes communities that have an ongoing commitment to environmental improvement and higher levels of tree care.

The City has also designated a number of mature and significant trees as "specimens". A total of 57 trees have

been registered as specimens and each year the Tree Commission makes recommendations for consideration to the City Council regarding additional specimen trees. **Figure 5-2** shows the location of specimen trees within the City. Refer to **Appendix 5-1** for specific information on individual specimen trees.

To the maximum extent possible, the City wishes to maintain and enhance its urban tree cover. During development, provisions must be made to protect existing trees and to replace trees when they are damaged or removed. The provisions of the City's Tree, Shrub, and Weeds Ordinance and the Chesapeake Bay Preservation Overlay District must be adhered to during all levels of development. In addition to development, the Ordinance addresses the removal of specimen trees on public and private property within the City. The City's Tree Commission and City Arborist monitor site plans for compliance with provisions of the Ordinance. Chapter 38 of the City Code also requires that some residential development and all commercial development proposals must have a tree survey reviewed and approved by the City Arborist. Tree surveys and tree protection and mitigation in the single-family detached residential areas of the City are regulated through the City's Chesapeake Bay Preservation Overlay District, Chapter 38-42. The City will continue to enforce and utilize these resources in a way that maximizes environmental protection through an increase in vegetative cover.

### *Watersheds, Streams, and Water Related Resource*

#### **Watersheds**

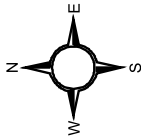
A watershed is defined as the geographic region within which water drains into a particular river, stream or body of water. Watersheds include hills, lowlands, and the body of water into which the land drains. The boundaries of watersheds are defined by the ridges of separating watersheds. The manmade and natural components of a watershed have a direct impact on the waterbodies into which the watershed drains.

The City of Falls Church is divided by two watersheds (as defined by the Virginia Division of Soil and Water Conservation), Four Mile Run (watershed #A22) and Cameron Run (watershed #A21), both of which drain into the Potomac River and eventually the Chesapeake Bay. See **Figure 5-3** for a depiction of the dividing line between these two watersheds.

Tripps Run, a tributary of Cameron Run, also flows through the City. The Four Mile Run watershed drains the northeastern portion of the City and the Tripps Run watershed drains the southwestern portion of the City. Named in the 1700s, Four Mile Run empties into the

Figure 5-2

Public and Specimen Trees



City of Falls Church

LEGEND

● Specimen trees

● Public trees

— City Boundary

See Appendix 5-1 for a description of specimen trees



2005 City of Falls Church Comprehensive Plan

File Name: Comprehensive Plan Maps 2005

File Location: h:/gis/pc proj/

Date Created: March, 2006

Data Sources: City Base Data Layers

Disclaimer: The City of Falls Church is not responsible for loss, if any, resulting from the use of this map or the related data.





Potomac River at the border between Arlington County and the City of Alexandria. Tripps Run drains to Lake Barcroft and converges with Holmes Run to form Cameron Run. Formerly named Union Branch, Upper Holmes Run, and Delaney Run, Tripps Run was named this century after Silas Tripp, a 19th century land owner on South Washington Street.

To determine how the City of Falls Church will face its watershed challenges, the City contracted with a consultant to create a Watershed Management Master Plan for Tripps Run and Four Mile Run in 1996. This plan recommends many items that are now requirements of the Chesapeake Bay Preservation Overlay District, stormwater management regulations, erosion and sediment control regulations, floodplain regulations, and the National Pollutant Discharge Elimination System (NPDES). The Plan also contains information from the Metropolitan Washington Council of Governments and the NVRC on regional plans and their potential impacts on the City. This plan should be updated to incorporate a number of watershed related regulations and programs that have changed since 1996.

### **Surface Water**

Four Mile Run begins in Fairfax County one mile north of the City and flows through a portion of Arlington County before entering the City under the W&OD Trail. Land use in the City's portion of the Four Mile Run watershed consists primarily of a mix of residential and commercial uses. According to a 1991 study of Four Mile Run by the Village Preservation and Improvement Society, from its intersection with South Washington Street to Van Buren Street, the channel width of the City's portion of Four Mile Run ranges from 13 feet to 35 feet, with a mean of approximately 24 feet. Bank height ranges from three and one-half feet to eight feet. Fine sediment, primarily sand and silt, is the most prevalent substrate material. The low gradient of the stream (0.14 percent) causes heavy silt deposition throughout the channel and is particularly noticeable in the upper segments. Downstream reaches are less sediment-laden and the bottom is composed of alternating sand and gravel bars with clay deposits in some areas.

Tripps Run begins in Falls Hill near Shreve Road in Fairfax County and is mostly piped underground or channelized with concrete within the City. Land use in the City's portion of the Tripps Run watershed is primarily residential. Where it is unaltered, the width of Tripps Run rarely exceeds 25 feet and during normal dry weather flow, the water is less than one foot deep. Stream banks rise vertically, averaging about three to four feet above the channel. The stream follows an essentially straight course with

gentle curves. The bottom composition in the natural reaches is a mixture of sand, gravel, and cobble.

At one time, both Four Mile Run and Tripps Run were fed by a manifold of small tributaries traversing the landscape. Over time, many of these small tributaries were bulldozed or diverted. Many more have been piped and are therefore not recognizable, except for the few places where some are exposed to the surface. These piped branches; however, are still important resources to the City and many bear the names of important former citizens and landowners of Falls Church.

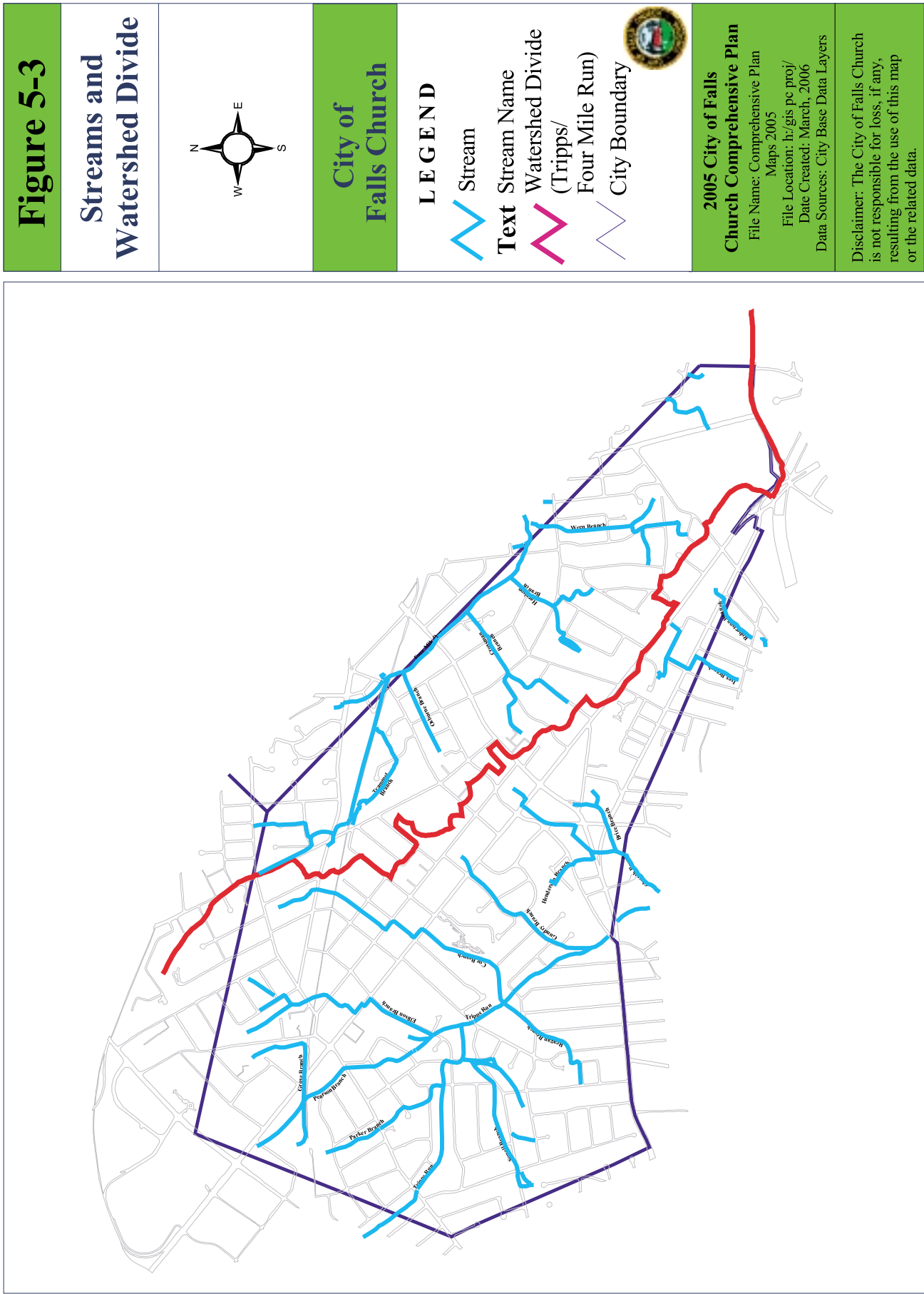
A very small percentage of the City's existing waterways are open or not piped and an even smaller percentage are natural. The City protects all of these remaining natural and open waterways from the impacts of development through the Resource Protection Areas that are regulated through the Chesapeake Bay Preservation Area Overlay District. These regulations are designed to preserve the City's remaining visible streams during development and redevelopment. The preservation of these areas and regulations are discussed later in this Chapter. **Figure 5-3** displays the City's watersheds and condition of its existing streams.

As Falls Church and surrounding areas rapidly developed in the years following World War II, land once covered by vegetation was replaced by impervious surfaces such as roadways, driveways, parking lots, and rooftops. Overall, the City now has an impervious surface area of approximately 50 percent. Increased imperviousness means that stormwater, rather than infiltrating through the soil, runs off as overland surface flow. The effects are three-fold. First, stormwater reaches the local stream course faster, increasing the flood potential for surrounding areas as the stream course is overwhelmed by stormwater. Second, as stormwater runs off impervious surfaces, it gains velocity and volume, increasing the chances that stormwater will cause erosion in unprotected areas and scour streambeds. Third, natural and man-made pollutants, which were once absorbed by vegetation or neutralized by infiltration through the soil horizon, are flushed directly into local stream courses.

### **Groundwater**

Ground water is the underground supply of water, which in this area is fairly close to the earth's surface. Many parts of the world still rely upon groundwater for their water supply. Overall, groundwater from sources in the Falls Church area, with few exceptions, are suitable for domestic, public, industrial, and irrigation purposes. If adequate water is available, with proper treatment, the quality can be adjusted to meet any given standard.

Although the City now receives a treated water supply from the Dalecarlia Reservoir, protection of the City's



groundwater is still important, for a variety of reasons. If groundwater becomes contaminated it can introduce toxins into soils and plant matter. Also in times of severe drought the area might need to tap into the groundwater supply for drinking water.

When development occurs, it also affects the natural balance of the groundwater flow. Increased imperviousness as a result of development reduces the potential for groundwater recharge as well as causing other impacts and should be taken into consideration when designing a site plan.

Areas that are prone to potential groundwater pollution should be identified before development occurs and improper development should be steered away from such areas. In addition, regular maintenance and inspection of potential sources of groundwater pollution is a critical component of groundwater protection. In general, the potential for groundwater pollution in the Piedmont is less than that of the Coastal Plain to the east and the Triassic Basin to the west. The potential for groundwater contamination near streams is heightened due to high water table and soils characteristics.

### **Streambanks**

Streambanks are part of the critical buffer areas adjacent to streambeds. They are the medium for a variety of vegetation that aids in the cleansing process for stormflow before it enters the streams. Streambanks play an important role in water quality protection and thus they should be preserved. However, they are constantly threatened by erosion, largely due to high velocity stormflow.

Erosion and sedimentation has been cited as one of the most pressing pollution problems faced by the City. Suspended sediments choke and muddy waterways making them uninhabitable to local species of aquatic life. In addition, nutrients and other pollutants attach themselves to sediment particles and contribute to eutrophic conditions in the Potomac River and the Chesapeake Bay.

Erosion has exposed the clay layer on the banks of Tripps and Four Mile Runs in many areas, but due to its cohesiveness, the clay has reduced the rate of channel widening. Banks in the area of the Washington Street culvert were ripped during the 1990s. However, the six to twelve inch diameter stones used were reported to be too small to withstand the force of high stream flows and have since eroded into the channel. Geowebbing was installed in this same area of the stream channel in 1990 just downstream of Gresham Place, a residential townhouse development. This was done to protect the banks from construction runoff. The regrading of the slope for geoweb installation and the growth of vegetation has increased the stability of

the banks in this reach. Erosion and sedimentation from upstream areas has also been identified as a major problem for the stream. The stream does not have sufficient velocity to regularly flush out sediment deposits and several sections of the streambed are covered with several feet of sediment. In 2003 Arlington County established a streambank stabilization demonstration project in Benjamin Banneker Park right inside of the City's boundary with the County.

As part of past City and private development projects, much of the Falls Church portion of Tripps Run has been piped and other parts have been lined with concrete or channelized, thus eliminating most of the potential for erosion along Tripps Run in the City. However the erosion in Tripps Run is still considered a major problem in other jurisdictions, and in the areas that are downstream of the City. Part of this erosion is caused by the increased flow of the channelized portion of Tripps Run that lies within the City and the increased stormwater velocity it creates. Places where erosion exists in the City's portion of Tripps Run include some exposed areas and in particular, the streambank near the West Street culvert.

Manmade channels can aid in flood control; however, they create a variety of other negative impacts to streams. Channels increase velocity in stormwater, which can create dangerous levels of erosion downstream of them. The channelization of Tripps Run has impacted its ecology and biodiversity and has likely contributed to the increased levels of siltation in Lake Barcroft, which is downstream of Tripps Run. Furthermore, channels flush non-point source pollution into local streams without the opportunity to be absorbed by vegetation or to infiltrate through the soil horizon. Natural streambeds with adequate riparian buffers, coupled with stormwater management facilities, are considered to be most environmentally sound approach to stream management.

### **Floodplain**

A floodplain is the relatively flat or low land area adjoining a river, stream, or watercourse that is subject to partial or complete inundation during storms of varying magnitude or frequency. It can also be an area that is subjected to the unusual and rapid accumulation of runoff or surface water from any source. Encroachment into floodplains, such as artificial fill, reduces a stream's flood-carrying capacity, increases flood heights, and increases flood hazards in areas beyond the encroachment itself. In addition, floodplain soils are often unsuitable for development due to high water table, shrink-swell potential, and highly permeable and hydric soil conditions. Floodplains also provide important habitat for a range of vegetative and animal species.



The one-hundred year floodplain in Falls Church lies alongside Tripps Run and Four Mile Run. It is mapped as an Overlay District to the City's underlying zoning districts and regulated by the City's Floodplain Ordinance.

In 1981 the Federal Emergency Management Authority (FEMA) conducted a study of flooding potential and hazards in Falls Church as part of its National Flood Insurance Program. As a result of the study, the City adopted a Floodplain Overlay District and map as part of the Zoning Ordinance in 1982. The Overlay District severely limits the type and location of any development in the floodplain district as defined in the Zoning Ordinance. The various floodplain districts include areas subject to inundation by waters of the one-hundred-year flood.

In 2003 another floodplain study was conducted for Tripps Run and new district lines were drawn. **Figure 5-4** displays the 100 year floodplain area as defined in 1981 and 2003 for Tripps Run and in 1981 for Four Mile Run. New development and redevelopment and the creation of more impervious surface within the watershed between 1981 and 2003 expanded the boundaries of the Tripps Run floodplain to include approximately 65 additional lots and homes.

Increased imperviousness as a result of development has historically caused flooding and erosion problems in the Tripps Run watershed. In response to these problems, several sections of Tripps Run were straightened and piped. In addition, many exposed channel portions of Tripps Run were straightened and/or lined with concrete during the late 1960s and 1970s to prevent erosion and to expand the watercourse's carrying capacity and speed the flow of stormwater through the City to reduce flood potential in this area.

## Wetlands

According to the US Fish and Wildlife Service National Wetlands Inventory (NWI), there are no federally identified wetlands within the City of Falls Church. While the NWI is an excellent resource for identifying significant wetlands areas, wetlands must be identified for an individual development site according to all applicable federal, state, and city wetlands regulations. Preliminary site evaluation of portions of the Four Mile Run floodplain by the Village Society in 1991 identified potential floodplain wetlands. However, this evaluation has never been verified. Significant wetlands do exist on the downstream portions of Tripps Run, Cameron Run, and Four Mile Run that are outside of the City. The potential effects of development on these wetlands should be taken into consideration.

## Chesapeake Bay Preservation Areas

The Commonwealth of Virginia has enacted legislation that defines and protects sensitive natural features in order to protect water quality. With the adoption of the Chesapeake Bay Preservation Act in 1988 and amended version in 2002, all jurisdictions located in Tidewater Virginia, were required to take measures to reduce water pollution levels in their tributary streams. In 2004 Falls Church adopted an updated preservation area program which restricts development within Resource Protection Areas (RPAs) along streams and requires more sensitive development practices in Resource Management Areas (RMAs).

### Resource Protection Areas (RPAs)

Sensitive features are classified into two separate categories, that are together called Chesapeake Bay Preservation Areas and are composed of Resource Protection Areas (RPA) and Resource Management Areas (RMA). RPAs are lands at or near the shoreline containing components that are especially sensitive because of (1) the intrinsic value of the ecological and biological processes they perform which benefit water quality, or (2) the potential for impacts that may cause significant degradation to the quality of State waters.

The RPA designation within the City includes a 100-foot vegetated buffer area located adjacent to and landward of all natural streams and manmade open channels as generally displayed on the City's Chesapeake Bay Preservation Area map shown in **Figure 5-5**. These lands are excluded from development in most instances and are protected under the City's Chesapeake Bay Preservation Ordinance.

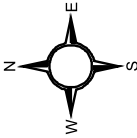
The City contains a number of small segments of RPA adjacent to its open streams. Several commercial redevelopment sites lie within the RPA, the most notable one being the Gordon Road Triangle. Since most of this site is currently impervious, the Chesapeake Bay Ordinance requires only that no new encroachment into the RPA take place and that any existing buffer remain with a ten percent pollution load mitigation to be achieved through some type of best management practices. Implementing the Chesapeake Bay Ordinance in this area and others throughout the City that are now classified as Resource Management Areas can have a significant impact on water quality.

### Resource Management Areas (RMAs)

Resource Management Areas (RMAs) include land types that, if improperly developed, have the potential to cause significant water quality degradation or diminish the functional value of the Resource Protection Area. In 2004 the

Figure 5-4

Floodplain



City of  
Falls Church

LEGEND

- 2004 Floodplain
- 1996 Floodplain
- City Boundary



2005 City of Falls  
Church Comprehensive Plan

File Name: Comprehensive Plan  
Maps 2005  
File Location: h:/gis pc proj/  
Date Created: March, 2006  
Data Sources: City Base Data Layers

Disclaimer: The City of Falls Church  
is not responsible for loss, if any,  
resulting from the use of this map  
or the related data.

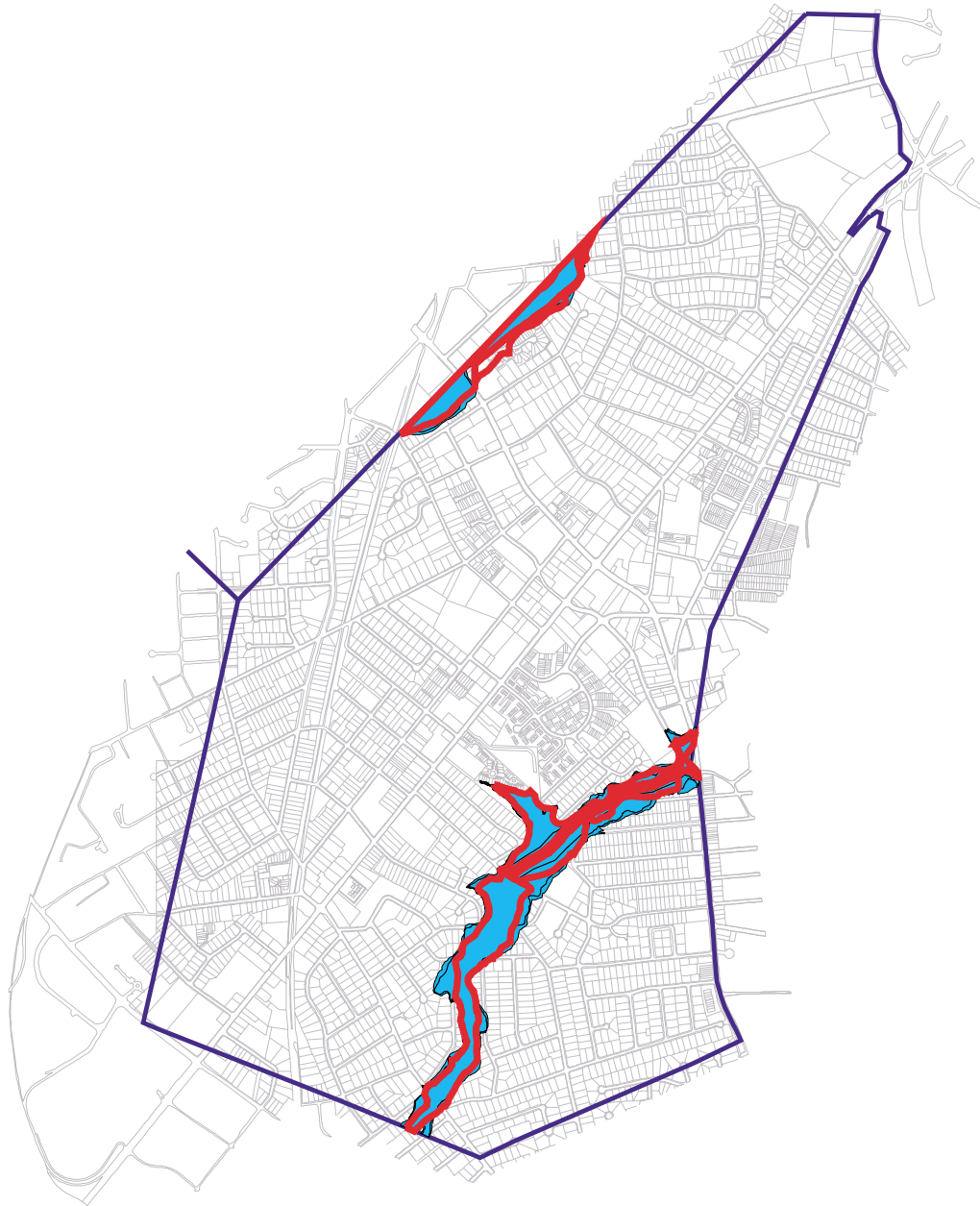
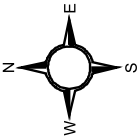


Figure 5-5

Chesapeake Bay  
Preservation Areas



City of  
Falls Church

LEGEND

- Resource Management Area
- Resource Protection Area
- Stream
- City Boundary



2005 City of Falls  
Church Comprehensive Plan

File Name: Comprehensive Plan  
Maps 2005  
File Location: h:/gis pc proj/  
Date Created: March, 2006  
Data Sources: City Base Data Layers

Disclaimer: The City of Falls Church  
is not responsible for loss, if any,  
resulting from the use of this map  
or the related data.



City of Falls Church designated the entire City as an RMA with the exception of land that was designated as RPA.

In order to minimize water quality impacts from land use and development, these Chesapeake Bay Preservation Areas have been delineated for Falls Church according to criteria established by the State Department of Conservation and Recreation. The criteria are intended to establish rules that local governments can use in granting, denying or modifying requests to rezone, subdivide, or to use and develop land in the RMAs and RPAs. Implementation of the criteria is to be achieved through use of performance standards, Best Management Practices, and various planning and zoning concepts.

A team of interdisciplinary staff is charged with reviewing every grading plan and all project applications within the Resource Protection Area to ensure consistency with the ordinance. The implementation of this ordinance and the work of this committee has and will continue to work with applicants to minimize the imperviousness of development sites through site design techniques; encourage the use of alternative surfaces for development features that are typically impervious; protect vegetation and mitigate vegetative loss due to construction; and encourage the use of green roofs and rooftop gardens to mitigate the impacts of impervious cover. Many other low impact site design techniques and best management techniques can be employed during redevelopment to reduce the volume of stormwater that will run off of sites and improve the quality of water running off of sites and re-entering the groundwater system.

### *Environmental Issues*

#### Water Quality

Maintaining and enhancing the quality of surface water is a concern for many urban jurisdictions. Different sources of direct and indirect pollutants reduce the quality of our surface and subsurface water sources. The increase of imperviousness, erosion and siltation, and the removal of tree canopy cover and vegetative buffer areas, have a generally negative effect on stream water quality. These impacts necessitate positive action by the City in the form of tree preservation and planting efforts. Water quality is also decreased by pesticide and fertilizer-laden runoff from adjacent lawns and by runoff from parking lots that may contain nutrients, heavy metals, and hydrocarbons. Other factors that must be taken into consideration include illegal dumping into stormsewers, antiquated sewer lines, trash and litter, leaking underground storage tanks, abandoned wells, or underground storage tanks. The following section describes the general categories of water pollution, some of their specific causes, regulations that are aimed at controlling them, and some water quality data for Four Mile Run and Tripps Run.

#### Point Source Pollution

Point source pollution is a specific source that flows into a stream and is therefore often the most easily recognizable and regulatable form of pollution. Industries and municipalities, under the Federal Clean Water Act, National Pollution Discharge Elimination System (NPDES), are required to report pollution discharges to water courses above a certain threshold, and to the maximum extent practicable, mitigate the effects of the pollution on the environment. The Virginia Department of Environmental Quality, Water Division, maintains records on these sources of pollution and is charged with ensuring that environmental regulations are enforced.

The City of Falls Church is one of 43 localities within urbanized areas of Virginia that has been automatically designated for storm water permitting under the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES), Stormwater Phase II Final Rule, because it has a separate storm sewer system (MS4s) and was not previously covered by Phase I. Phase II requires municipalities (cities and counties) with populations between 10,000 and 100,000 and population densities greater than 1,000 persons per square mile to establish a management system to control polluted storm water discharges into local watercourses. Phase II became effective on March 10, 2003 and at that time, affected municipalities were required to obtain a permit to operate their storm water systems and to develop storm water management plans for compliance with the Phase II regulations. After March 10, 2003, municipalities have five years to develop and implement a final storm water management plan.

On February 24, 2003, the Falls Church City Council passed a resolution authorizing the City Manager to execute and submit an NPDES Phase II Registration Statement to the Virginia Department of Environmental Quality (VDEQ) and to commit the City of Falls Church to developing and implementing a storm water management program to comply with the VDEQ General Permit as an operator of a small municipal separate storm sewer system (MS4).

Since that time, the City has been working to develop a stormwater management plan to control polluted discharges into local watercourses to the "maximum extent practicable." Implementation of this plan will occur during upcoming years and will include the stringent regulation of private BMPs and the increased maintenance of existing stormwater control facilities, public education and outreach programs, and illicit discharge detection and prevention.

There is one NPDES point source discharge point upstream of the City in Fairfax County that impacts water quality in Tripps Run. This point is registered as a concrete



batching plant that is located on the Pearson Branch of Tripps Run to the immediate west of the City limits. Water discharged from this plant is treated for high levels of alkalinity. There are currently no municipal discharge points in Falls Church that fall under NPDES regulations.

Other sources of point source pollution are leaks in antiquated sewer lines and underground storage tanks. The City has been programmatically replacing and repairing aging sewer lines on an annual basis. However, when new development or redevelopment is occurring, access to the associated lines becomes much less costly and time consuming and should be pursued whenever possible. Underground storage tanks should also be detected during the development process and either capped, filled, or removed whenever possible.

### Nonpoint Source Pollution

Nonpoint source pollution is pollution that cannot be attributed to a single source, but rather is the result of many diffuse sources. Most commonly non-point source pollution is caused by rainfall running off of roadways, parking lots, roof tops, and other urban land uses. Urbanization increases the imperviousness of the land area, thereby increasing the amount and velocity of stormwater runoff delivered to nearby streams. Pollutants that would normally settle out or infiltrate through the soil are carried directly to local waterways. On a per acre basis, urban land use in general, including residential development, produces higher annual non-point source pollutant loadings of nutrients, heavy metals, and oxygen-depleting substances than do rural agricultural uses. In addition to transporting pollution, increased runoff also increases instream flow during and immediately after periods of precipitation. Oil contamination, sediments, pesticides, metals, and other toxic substances can kill fish and destroy bottom life.

Since the City of Falls Church lies within the Tidewater area of Virginia, which has a significant impact on the health of the Chesapeake Bay, controlling nonpoint source pollution is an important aspect of the City's environmental protection efforts. The Virginia Division of Soil and Water Conservation has designated the control of nonpoint source pollution as a high priority in the Cameron Run (Tripps Run) and Four Mile Run watersheds.

Nonpoint source pollution from urban areas can be reduced by minimizing the amount of impervious area on a development site, utilizing open space and preserving indigenous vegetation, restoring denuded vegetative stream buffers, and employing the use of structural best management practices (BMPs), which operate by trap-

ping stormwater runoff and detaining it until unwanted nutrients, sediment, and other harmful pollutants are allowed to settle out or be filtered through the underlying soil. These trapped pollutants are then disposed of through periodic maintenance of the BMPs.

The City's Chesapeake Bay Preservation Ordinance and the Erosion and Sediment Control Ordinance regulate non-point source pollutants. [Insert links to both chapters] These are described in greater detail in the [regulations section](#) of this chapter.

### Water Quality Data

For water quality standards, both Tripps Run and Four Mile Run are classified as Class III streams, those which are non-tidal in nature in the Coastal and Piedmont zones. Under the federal Clean Water Act (CWA), all state waters are expected to be maintained to support "swimmable and fishable goals," that is recreational use and the propagation and growth of all aquatic life reasonably expected to inhabit them. The parameters used to determine these are minimum and daily average dissolved oxygen content (DO), pH (acidity/alkalinity), maximum temperature, and fecal coliform bacteria levels.

Temperature, DO, and pH are the primary indicators of the health of the aquatic ecosystem. The presence of DO in water is essential for aquatic life and the type of aquatic community is dependent to a large extent on the concentration of dissolved oxygen present. Temperature affects feeding, reproduction, and the metabolism of aquatic animals. A week or two of high temperatures each year may make a stream unsuitable for sensitive aquatic organisms, even though temperatures are within tolerable limits throughout the rest of the year. Strongly related to pH are biological productivity, stream diversity, metal solubility, and the toxicity of certain chemicals, as well as important chemical and biological activity. Fecal coliform levels are the most important from a human health standpoint. These indicator organisms, while not necessarily harmful in themselves, are found in the intestinal tracts of warm-blooded animals, including humans, and therefore can be indicative of fecal contamination and the possible presence of pathogenic organisms. **Figure 5-6** presents the minimum water quality standards for Class III waters.

**Figure 5-6 • Virginia Fishable and Swimmable Water Quality Standards for Class III Waters**

Water Quality Component	Virginia Water Quality Standard
Minimum Dissolved Oxygen Content (mg/l)	4.0
Daily Average Dissolved Oxygen Content (mg/l)	5.0
pH	6.0-9.0
Maximum Temperature (C/F)	32.0°/89.6°
Maximum Fecal Coliform Bacteria (instantaneous count)	1,000 cells/100 ml
Maximum Fecal Coliform Bacteria (geometric mean of 2 or more samples collected within a 30 day period)	200 cells/100 ml

Source: Virginia Department of Environmental Quality, 2003.

Water quality testing has been conducted in both Four Mile Run and Tripps Run. The Four Mile Run watershed has been analyzed by the Northern Virginia Regional Commission (NVRC) for over a decade. NVRC Test Station "Seven" is located on the Four Mile Run mainstem at the Falls Church/Arlington County line, just down stream of the Van Buren Street culvert. Four Mile Run was placed on the State's impaired list in recent years and was required to create a plan for reducing the Total Daily Maximum Load (TMDL) of fecal coliform. This study and plan was created by the NVRC and adopted in 2002. The study and implementation plan may be found on the NVRC website at <http://www.novaregion.org>.

Water temperature on average in Four Mile Run meets Virginia Class III water quality standards. During summer months, however, these standards are violated with a maximum reported temperature at 41 C°.

Since 1990 over 700 fecal coliform samples have been taken in Four Mile Run. Nearly half of these samples have included more than the 1,000 cell per 100 milliliter state standard for fishing and swimming. This level has fluctuated from season to season. **Figure 5-7** displays the combined mean for all testing done in Four Mile Run between 1999 and 2001. One value that was many times the mean value was thrown out.

**Figure 5-7 • Mean Fecal Coliform Concentrations for Combined Stations in Four Mile Run by Season from 1991 – 2001**

Season	Fecal Coliform (cells/100 ml)	Acceptable Level of Fecal Coliform (cells/100 ml)
Winter	690	200
Spring	1,022	200
Summer	1,381	200
Fall	1,429	200

Source: NVRC Four Mile Run TMDL Final Report, 2002.

Water quality for Tripps Run is monitored by the Fairfax County Health Department downstream of the City limits at the intersection of Tripps Run and Sleepy Hollow Road (Station 12-04). Water quality parameters measured include fecal coliforms, dissolved oxygen, pH, total nitrogen, and total phosphorus.

No recent specific oxygen or fecal coliform indicator data is available at this time for Tripps Run; however, Fairfax County in its Stream Protection Strategy, Baseline Study from January 2001, rated Four Mile Run in terms of its biological health. Overall, its site condition was rated "very poor". This rating is relative to a poor index of biotic integrity or low level of diversity in benthic microinvertebrates. Four Mile Run was also rated "very poor" in terms of habitat condition and "very low" in terms of fish species. These criteria are all indicators of water quality.

Streams and water quality can be protected during development and redevelopment by reducing the volume of runoff and pollutant load that may have previously been generated by the property. This can be accomplished by reducing impervious cover, utilizing rainwater catchment devices such as cisterns, utilizing green roof technology and rooftop gardens, minimizing the amount of surface parking and size of driveways, and implementing many other types of best management practices on the sites. The City staff Chesapeake Bay Interdisciplinary Review Team (CBIRT) is charged with implementing the requirements of the Chesapeake Bay Preservation Ordinance and typically recommend the tools suggested above as a means to protect water quality.

### Air Quality

The passage of the Federal Clean Air Act Amendments of 1990 is requiring significant changes in air quality planning and implementation at local, state, and regional levels. The legislation, which encompasses a broad range of planning and regulatory requirements, mandates specific emission control measures and sets a target date of 2005 for the attainment of ozone and carbon monoxide health standards in the Washington metropolitan region. Northern Virginia is currently considered a "serious non-attainment" area for ozone. In the Washington area, the generation of ozone and carbon monoxide is largely attributable to mobile sources, and in particular to the use of automobiles. Falls Church and other jurisdictions in the region will be required to implement enhanced vehicle emissions inspection programs and use special fuels during the winter to reduce carbon monoxide.

Many of the most effective approaches to improving air quality from mobile source emissions will be implemented at state and regional, rather than local levels, through such

programs as increased public transportation, high occupancy vehicle lanes, and highways. Technological advances such as alternative fuel vehicles, reformulated fuels, vapor-catching fuel dispensing systems, and tighter tailpipe standards are other measures whose widespread application is expected to contribute to improved air quality.

Falls Church contributes to regional air quality policy development through its representative to the Metropolitan Washington Council of Governments Air Quality Council. It is important that these policies are developed and implemented regionally in order to maximize their impact. Falls Church seeks to contribute to the larger effort by adopting policies to increase public awareness of the environmental problems associated with increased ozone and carbon monoxide levels. Establishment of transportation policies that encourage ride-sharing, use of public transportation, and alternate forms of travel such as walking and bicycling will contribute to the effectiveness of the Clean Air Act.

### *Existing Regulations to Protect the Environment*

The City of Falls Church has many tools at its disposal to preserve and to protect sensitive environmental features. The following section presents an overview of existing City ordinances related to environmental protection.

### *Zoning and Subdivision Ordinances*

Many ordinances and regulations address issues related to the City's natural resources. In particular, the City's Zoning Ordinance contains provisions that provide valuable tools for natural resources protection and enhancement. The City's rezoning process and site plan review process also provide opportunities for developers and the City to protect natural resources. In addition, opportunities exist to adopt new ordinances to address issues of concern to City residents. These options are presented in the "[Goals and Strategies](#)" section of this chapter.

### *Chesapeake Bay Preservation Act*

The Virginia Chesapeake Bay Preservation Act (Chapter 25, Title 10.1 of the Code of Virginia) established a program to protect water quality in the Chesapeake Bay watershed. In accordance with the guidelines established by the State Act, the City of Falls Church adopted its own Chesapeake Bay Preservation Area Overlay District ([Section 38-42](#)) as part of the City's Zoning Ordinance. This Ordinance maps Chesapeake Bay Preservation Areas (CBPAs), that are composed of [Resource Protection Areas](#) (RPAs) and [Resource Management Areas](#) (RMAs). It is designed to protect vegetation and reduce impervious surface throughout the City and to ensure that water quality is not further degraded by changes to the natural environment, including the very sensitive Resource

Protection Areas. The Ordinance also specifically regulates tree protection and replacement and establishes a minimum percentage of tree canopy on properties undergoing development in the City's low density residential, R-1A and R-1B Zoning Districts.

The mapping of the original CBPAs in 1990 was based on a survey of existing natural resources documentation as well as field surveys. In 2004 the City's Chesapeake Bay Preservation Ordinance (Section 38-42) and RPA and RMA designations were amended to significantly expand the overlay district. The RMA now covers the entire City with the exception of those lands that are classified as RPAs. This means that the Ordinance's general performance criteria are now applicable to any land disturbance over 2,500 square feet within the City and to all land disturbances within the Resource Protection Areas. The general performance criteria require that all possible indigenous vegetation should be saved and that land disturbance and impervious surface be minimized. The City staff's Chesapeake Bay Interdisciplinary Review Team (CBIRT) reviews all projects that are regulated by the ordinance (all properties that lie within the RPA and all others that disturb 2,500 square feet of land or more) and makes recommendations for each site that are designed to protect water quality.

Ten stream segments are currently designated as Resource Protection Areas. The Ordinance requires 100 foot vegetated buffer areas along stream banks either be maintained or recreated if they do not exist. In the City this 100 buffer rarely exists if at all and rarely can be recreated and almost all sites are developed under redevelopment scenarios. Therefore, the City will work with property owners to the best of its ability to preserve or recreate as much buffer as is feasible.

### *Erosion and Sediment Control Ordinance*

The purpose of the City's Erosion and Sediment Control Ordinance is to prevent the degradation of properties, stream channels, waters, and other natural resources by providing that adequate soil erosion and sediment control measures are taken before, during, and after the period of site clearance, development, and construction to keep sediment laden runoff from entering and damaging the City's tributaries. Landowners are also required to control rainfall runoff in order to protect neighboring properties and to preserve existing natural stream channels.

Under this Ordinance, land owners proposing a non-exempt regulated land disturbing activity of greater than 2,500 square feet must first submit an erosion and sediment control plan to the City's Department of Environmental Services. This includes a grading plan. The City's erosion and sediment control requirements are detailed in [Chapter 9 of the City Code](#).

*Tree, Shrubs, and Weeds Ordinance*

The purpose of the City's Tree, Shrubs, and Weeds Ordinance (Chapter 35 of the City Code) is to strengthen the City's ability to protect and enhance one of its most valuable natural resources. The Ordinance regulates the removal of trees from public and private property, with the exception of within the City's low-density residential zoning districts (R-1A and R-1B). In these districts the preservation and revegetation is regulated within the Chesapeake Bay Preservation Overlay District. The Tree, Shrubs, and Weeds Ordinance establishes standards limiting the removal of and insuring the replacement of trees sufficient to safeguard the ecological and aesthetic integrity of the community's environment. In addition, the Ordinance was enacted to prevent the unnecessary clearing and disturbing of land so as to preserve, insofar as is practicable, the natural and existing growth of vegetation; to replace, when feasible the removed trees with the same, comparable, or improved species; to provide protective regulations against hazardous trees and diseased trees or shrubs, and the growth of weeds and brush; to control activities relative to trees and plantings upon the streets or public properties of the City; to establish a licensing procedure for tree contractors; and to provide for the establishment of a Tree Commission.

*Landscape Ordinance*

The purpose of the City's Landscape Ordinance (Chapter 38-30) is to preserve existing healthy vegetation and provide new landscaping on sites that are being developed or redeveloped in commercial and residential areas. Natural vegetation and landscape plantings are an important community asset as they provide many environmental benefits, enhance community character, and add to property values. The goals of the Landscape Ordinance are to reduce soil erosion and stormwater runoff and protect water quality by minimizing removal of existing vegetation; require minimum tree canopy coverage on residential lots, enhance the appearance and preserve the character of the surrounding properties and public rights-of-way; improve the environment for pedestrians along streets and within parking lots and other pedestrian areas; conserve energy and moderate solar radiation through the use of shade tree plantings in parking lots and streets; visually integrate developments into the existing landscape and minimize potential conflicts between abutting developments, and ensure that a natural vegetative area of appropriate size and density is located between zoning districts and improve the quality of vegetation selection through the implementation of landscape standards and specifications.

*Floodplain Ordinance*

In 1981 the Federal Emergency Management Agency (FEMA) investigated the existence and severity of flood hazards in the City of Falls Church to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, and to convert Falls Church to FEMA's regular flood insurance program. The study was also meant to be used by local and regional planners in their efforts to promote sound floodplain management. To these ends, the City established a Floodplain District as part of the City's Zoning Ordinance in 1982 (Section 38-38.). Another study was conducted in 2002 to determine if the size of the floodplain had changed and it had expanded somewhat to include approximately 65 new structures and parcels of land.

The purpose of the City's overlay district is to prevent the loss of life and property, the creation of health and safety hazards, the disruption of commerce and governmental services and the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base.

**Figure 5-4** presents areas of Falls Church which have been designated as being floodprone (the one-hundred year floodplain) for which the City's ordinance applies. This area was redelineated in 2003 by FEMA.

*Animal Waste Removal Law*

The City does have a law that requires animal owners to pick up and dispose of waste [Section 4-15(b)]. This law is enforced as stringently as time allows.

*State and Federal Regulations*

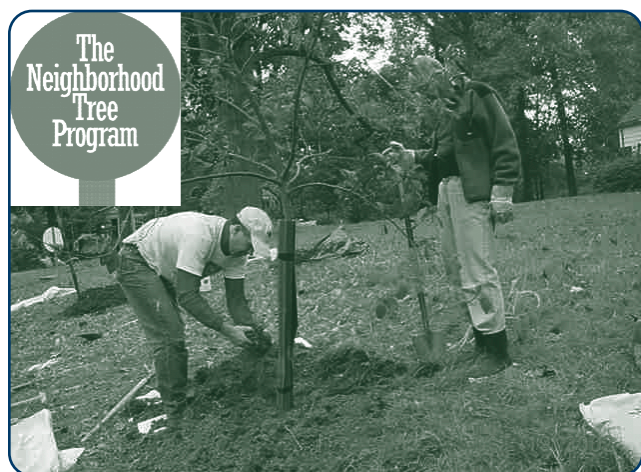
In addition to local ordinances, state and federal regulations, enforced through various agencies, protect valuable natural resources. These regulations are further discussed in this chapter in the section titled "Existing and Potential Sources of Environmental Pollution."

## **Volunteerism and Natural Resources Protection**

Many civic organizations continue to act on behalf of the citizens of Falls Church to protect the environment. In 1991 the Village Society published the Report on the Proposed Restoration Concepts for the Urban Forest Stream Valley Demonstration Project, Upper Four Mile Run, which outlines strategies to increase water quality and to decrease erosion in Four Mile Run. As a result of the report, a "no mow" buffer strip along Four Mile Run in East Falls Church park was adopted. This work should be continued and increased to whatever extent is possible.



In 2000 an assessment of information of the City's street tree population revealed that there was a net loss of 15 street trees a year, despite the City's efforts to replant many trees that had to be removed. Alarmed at this trend, members of the Village Preservation and Improvement Society (Village Society) requested assistance from the Falls Church Tree Commission and the City Staff in creating the Neighborhood Tree Program (NTP). This program is operated under the guidance of the City Manager and the City's Urban Forestry Division to increase the number and quality of street trees in the City and to educate citizens on the value of trees. Over 100 volunteers have taken part in planting parties each spring and fall to focus on single neighborhoods for concentrated tree-planting efforts. In addition, NTP volunteers have worked on designation weekends to plant street trees all over the City in places where individual requests have been made. Over the past four years this program has significantly increased the number, diversity and quality of the street trees in Falls Church. It has also adapted to the needs of the community to include requested tree plantings in addition to the bi-yearly community building street planting events.



The Stream Stewards program was established in 2002. Through this program, citizen volunteers are trained to help educate citizens about watershed protection and to help lead volunteer stream protection events, such as storm drain markers, removal of streamside invasive plants, and stream cleanups. In addition, Stream Stewards make presentations to school groups, civic organizations, and homeowners associations.

As part of a grant received from the National Fish and Wildlife Foundation, in partnership with Arlington County, the City of Alexandria, Arlingtonians for a Clean Environment, and the Northern Virginia Conservation Trust, the City of Falls Church is participating in a national pilot program that provides watershed education on a neighborhood level. It is called the Livable Neighborhoods Water Stewardship Program. Since 2003, eight households in the City hosted a series of four two-

hour meetings attended by their neighbors and led by a trained volunteer leader. The purpose of these meetings is to help people learn how their choices impact the watershed and to provide the support and motivation to make choices that will help improve local streams. Participants receive workbooks from which they select actions to try out between meetings.

In addition to the programs mentioned above, a number of civic groups, including the Village Society and the Arlington League of Women Voters, have been active in the past in gathering water quality and natural resource data as well as implementing stream monitoring projects and improvements. The Village Society has sponsored Best Management Practices workshops on Four Mile Run, the "Adopt-a-Stream Month" program, the annual Arbor Day tree plantings and other requirements for the national designation of "Tree City, USA." The Neighborhood Tree Program has successfully planted many new trees within residential neighborhoods and created support for the preservation of trees in the City.

## Regionalism and Natural Resources Protection

Because both Tripps Run and Four Mile Run have headwaters outside the City limits, the City must continue its regional approach to watershed management. Land use decisions in Arlington County and Fairfax County will have immediate and noticeable effects on the City's streams. Falls Church will continue to participate in programs, such as the NVRC Four Mile Run Program, which foster inter-jurisdictional communication and cooperation.

## Pollution Prevention and Solid Waste Management Programs

Due to the fact that land use patterns within the City of Falls Church are generally well established, much of the City's Chesapeake Bay Program relies on the implementation of programs to prevent pollutants from entering stormwater in the first place. The City and its civic organizations already sponsor a variety of pollution prevention activities that accomplish many of the City's water quality and natural resource goals. These programs are inter-departmental in nature and require coordination and cooperation between the departments of Planning and Environmental Services and a number of other City agencies and civic organizations. See also the solid waste management section of Chapter 8 for more information on these programs.

- The City offers special solid waste pick-ups to help avoid dumping, especially in the wooded stream valleys;

- The City provides education and promotes the mulching or composting of grass clippings. Clippings to be disposed of must be bagged and a City ordinance prohibits placing loose grass (or other debris) in the gutters;
- The City provides curbside leaf and brush pick-up and provides free leaf mulch delivery;
- The City has a premier curbside recycling program and employs a full-time coordinator responsible for the very comprehensive public and private sector initiatives in the City. A drop-off facility also exists within the City;
- The City and the Environmental Services Council provide public education on litter prevention, resource conservation, and recycling through cable television, school programs, City newsletters, pamphlets, flyers and programs to clubs and organizations;
- The City coordinates the Recycling "block captain" program through which 120 citizen volunteers distribute information to their neighbors five to six times a year;
- The City conducts periodic campaigns to inform residents about how to dispose of household hazardous wastes;
- The City conducts periodic clean-up days where volunteers collect litter throughout the City;
- The City sponsors monthly "City Walks", one hour historic tours and litter pickup in different areas of the City;
- The City's Environmental Services Council petitions regularly for expansion and improvements to City-wide efforts;
- The City informs citizens of oil recycling collection points at automotive service centers in the City;
- The City sponsors backyard composting classes to encourage residents to put yard waste to good use; and
- The City picks up trash on City streets and collects and deposits debris at the I-66 transfer station on a regular schedule.

While the City's extensive pollution prevention program aids the City in achieving its water quality goals, some areas of particular concern identified in the inventory section of this document remain. In particular, unacceptably high fecal coliform levels in Tripps Run and Four Mile Run indicate the need for the City to take strong steps to correct this problem.

### **Future Trends and Projections**

The City of Falls Church has made significant strides toward protecting and enhancing its natural resources. The City's Erosion and Sediment Control Ordinance has reduced the incidence of unnecessary erosion and sediment runoff during and after development through soil

and water conservation techniques. The Floodplain Ordinance has restricted improper development in the most sensitive areas of the City, which contain its primary ecological habitat as well as its most sensitive soils. The Trees, Shrubs and Weeds Ordinance has resulted in the preservation and protection of many trees, including a number of specimen trees that have been deemed valuable to the character of the City.

The Chesapeake Bay Preservation Overlay District was expanded in 2004 to cover the entire City. The Chesapeake Bay Interdisciplinary Review Team has worked with property owners on low impact design techniques, such as the use of semi-pervious pavers in driveways and sidewalks, the creation of rain gardens, the reduction of land disturbance areas, the protection of existing vegetation, and the re-establishment of tree canopy and RPA vegetated buffer areas. This Team will continue these efforts and over time hopes to work with property owners on the installation of such water quality protection devices as cisterns and green roofs. The CBIRT team also received a grant from the Virginia Department of Conservation and Recreation to create a stormwater improvement demonstration project in one of the rear City Hall parking areas. Other municipal demonstration projects are anticipated in the future, such as the daylighting of streams on public property, the installation of filters in the City's stormsewers and catch basins, and the creation of an on-going water quality monitoring program.

The City will continue to sponsor pollution prevention programs to improve water quality and to protect the environment, including special City pick-ups, to help avoid illegal dumping in the woods of the stream valleys; encouraging residents to mulch clippings and other yard waste; requiring that clippings that are not mulched are bagged; prohibiting loose grass and other litter from being placed in gutters; and operating eight designated oil recycling collection points. In addition, volunteers conduct monthly City walks to collect litter in neighborhoods and the block captain program and the Environmental Services Council are on-going City-sponsored volunteer opportunities. An extensive public education program will continue to teach litter prevention, resource conservation, tree care, and recycling through public access cable television, school programs, and free City publications.

The implementation of the City's Non-Point Discharge Elimination System (NPDES) Program should improve the quality of stormwater discharge into Tripps and Four Mile Runs and their tributaries. Additional water quality initiatives and public education campaigns have begun and will continue as a result of this program.

In 2003 the City also participated in a regional "Water-Wise" water conservation public relations campaign, but

currently does not have an extensive water conservation program. The City should pursue opportunities to incorporate water conservation education into its current pollution prevention programs including its school curriculum. The City may wish to pursue grant opportunities that are available for such programs.

In 2004 the City received a grant from the Virginia Department of Cultural Resources to implement a variety of water quality improvement techniques at two City-owned facilities including a number of cisterns at the City's property yard, and a rain garden and stormwater fil-

tration system at City Hall. Additional grant opportunities should be sought for public demonstration projects.

The City's Natural Resource and Environmental goals and strategies are to be achieved through a variety of means. The goals and strategies within the matrix below describe methods for implementing the suggested changes. The "Required Action" and "Responsible Party(ies)," columns of the matrix provide additional guidance to the City in areas which will require additional actions or resources to achieve the City's natural resources and environmental preservation goals and strategies.

#### Appendix 5-1 • SPECIMEN TREE LIST – The City of Falls Church as of 2005

#	Common Name	Botanical Name	Year	Size	Address
1.	American basswood	<i>Tilia americana</i>			225 E. Broad St.
2.	American basswood	<i>Tilia americana</i>			222 N. Cherry St.
3.	American beech	<i>Fagus grandifolia</i>	2002	45"	216 Great Falls St.
4.	American beech	<i>Fagus grandifolia</i>		43"	405 N. Washington St.
5.	American elm	<i>Ulmus americana</i>		42"	404 Great Falls St.
6.	American elm	<i>Ulmus americana</i>		38"	410 Great Falls St.
7.	American elm	<i>Ulmus americana</i>		42"	315 Little Falls St.
8.	American holly	<i>Ilex opaca</i>			Cherry Hill Park
9.	American holly	<i>Ilex opaca</i>			City Hall
10.	American holly	<i>Ilex opaca</i>			City Hall
11.	American sycamore	<i>Platanus occidentalis</i>			Thomas Jefferson School
12.	American sycamore	<i>Platanus occidentalis</i>			Tripps Run / Sherrow Ave.
13.	bald cypress	<i>Taxodium distichum</i>			215 W. Columbia St.
14.	bald cypress	<i>Taxodium distichum</i>			215 W. Columbia St.
15.	big leaf magnolia	<i>Magnolia macrophylla</i>		18/20"	508 Lincoln Ave.
16.	bitternut hickory	<i>Carya cordiformis</i>			115 E. Fairfax St.
17.	black oak	<i>Quercus velutina</i>			S. Cherry St. / Whittier
18.	black oak	<i>Quercus velutina</i>			S. Cherry St. / Whittier
19.	black oak	<i>Quercus velutina</i>			S. Cherry St. / Whittier
20.	black oak	<i>Quercus velutina</i>			S. Cherry St. / Whittier
21.	black walnut	<i>Juglans nigra</i>			209 N. Oak St.
22.	copper beech	<i>Fagus sylvatica "Cuprea"</i>			606 E. Columbia St.
23.	dawn redwood	<i>Metasequoia glayptostroboides</i>			604 Laura Dr.
24.	dawn redwood	<i>Metasequoia glayptostroboides</i>		42"	704 Lincoln Ave.
25.	dawn redwood	<i>Metasequoia glayptostroboides</i>		43"	706 Lincoln Ave.
26.	deodor cedar	<i>Cedrus deodara</i>		30"	325 Little Falls St.
27.	eastern hemlock	<i>Tsuga canadensis</i>		27"	325 Little Falls St.
28.	eastern white pine	<i>Pinus strobes</i>			200 Cleave Dr.
29.	hackberry	<i>Celtis occidentalis</i>	2002	25"	209 E. Broad St.
30.	Japanese maple	<i>Acer palmatum</i>			201 N. Washington St.
31.	Japanese maple	<i>Acer palmatum</i>			210 N. West St.
32.	Norway spruce	<i>Picea abies</i>			109 E. Columbia St.
33.	Norway spruce	<i>Picea abies</i>			222 N. Cherry St.
34.	paulownia	<i>Paulownia tomentosa</i>			Wrens Way
35.	pecan	<i>Carya illinoensis</i>			West End Park
36.	pin oak	<i>Quercus palustris</i>			202 Noland St.
37.	river birch	<i>Betula nigra</i>	2002	24"	Cavalier Park
38.	scarlet oak	<i>Quercus coccinea</i>			604 S. Oak St.

## Appendix 5-1 • SPECIMEN TREE LIST – The City of Falls Church as of 2005 (continued)

#	Common Name	Botanical Name	Year	Size	Address
39.	Schwedler maple	<i>Acer platanoides</i> "Schwedleri"			1110 Jackson Ct.
40.	shagbark hickory	<i>Carya ovata</i>			Gresham Place
41.	silver maple	<i>Acer saccharinum</i>			708 Berry St.
42.	southern magnolia	<i>Magnolia grandiflora</i>			613 Oakhaven Dr.
43.	southern red oak	<i>Quercus falcata</i>			209 N. Oak St.
44.	sugar maple	<i>Acer saccharum</i>			513 E. Broad St.
45.	sweetgum	<i>Liquidambar styraciflua</i>			218 N. Cherry St.
46.	tulip tree	<i>Liriodendron tulipifera</i>			106 Buxton Rd.
47.	tulip tree	<i>Liriodendron tulipifera</i>			108 W. Cameron Dr.
48.	tulip tree	<i>Liriodendron tulipifera</i>			115 E. Fairfax St.
49.	tupelo	<i>Nyssa sylvatica</i>		52"	Cherry Hill Park
50.	white oak	<i>Quercus alba</i>			115 E. Fairfax St.
51.	white oak	<i>Quercus alba</i>		46"	1024 Birch St.
52.	white oak	<i>Quercus alba</i>		60"	310 Grove Ave.
53.	white oak	<i>Quercus alba</i>			215 E. Jefferson St.
54.	white oak	<i>Quercus alba</i>			411 E. Jefferson St.
55.	white oak	<i>Quercus alba</i>			1015 Parker St.
56.	willow oak	<i>Quercus phellos</i>			206 E. Jefferson St.
57.	willow oak	<i>Quercus phellos</i>			106 Noland St.

*VISION: The City of Falls Church will continue to be committed to the protection, preservation, and restoration of its natural environment. Recognition of the linkage between land use, water quality, air quality, and its effect on the Tripps Run and Four Mile Run watersheds, as well as on the overall quality of life here, will guide the management of the City's environmental resources. Efforts will be made towards the restoration of those streams and watercourses capable of supporting diverse populations of native species in a healthy aquatic ecosystem. Flooding and stream degradation from development will be mitigated, improving water quality in local waterways as well as in the Potomac River and the Chesapeake Bay. Trees and streams will continue to be recognized as valuable economic, environmental, and aesthetic resources. Development decisions will be guided by a respect for the natural topography of the land. The City of Falls Church will support expanded efforts to provide residents with a wide range of opportunities to interact with and learn about their natural environment. A network of trails and green spaces, both public and private, will link the City's neighborhoods to surrounding communities.*

### GOAL 1. Identify natural resources that are important to the character of Falls Church.

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Continue to add natural resource layers to the City's evolving Geographic Information System (GIS).	<p>The City currently does not have an inventory of many natural features such as stream banks, soils, stream vegetation, wildlife habitat, and invasive species. The City's existing non-public tree layer is not very accurate; however, the City does have an accurate public tree inventory. In order to protect the other features, they must be identified and accurately recorded. The City's GIS system is the most efficient method for collecting and recording this data.</p> <p>The City does not have soils data and it would be very helpful for use in stormwater control, land use planning, and specific plans for development. The U.S. Geological Survey (U.S.G.S.) will perform this type of analysis for the City at a cost.</p>	<p>Collect data on stream banks, stream vegetation, all, non-public trees, and invasive species.</p> <p>Contract with a private source to collect soils and groundwater profile data for the City.</p>	Planning and GIS Divisions and Department of Environmental Services
B. Collect and use the GIS information about sensitive natural features obtained through the development process and through the work of citizen volunteer groups.	Much valuable information on sensitive natural features within the City is obtained through the site plan review and development process. In addition, the City has many citizen volunteer groups that gather information on natural features, including stream biota and visible signs of pollution. The City should capitalize on these valuable sources of information by working with developers and citizen organizations to incorporate this information into the City's GIS.	<p>Convert information provided in tree surveys and Chesapeake Bay related applications to upgrade data in the GIS.</p> <p>Add volunteer generated data to the GIS database when appropriate.</p>	Planning and GIS Division
C. Identify and map areas in the City that are impacted by invasive plant species.	Invasive plants thrive in disturbed sites and disturbed native plant communities, as found in urban areas, are most vulnerable to invasion. Even the most invasive species can infest an intact ecosystem and destroy healthy non-invasive vegetation. Invasive plants are costly to manage, as they are free of natural controls such as insects and diseases that keep them in balance in their native habitats and decrease biodiversity.	<p>Develop an educational/outreach program for residents that includes information on the identification, management and removal of invasive plants.</p> <p>Implement a management program on public property to limit the introduction and spread of problematic plants.</p>	Planning Division/City Arborist and Department of Environmental Services



**GOAL 2. Reduce the impacts of existing and new development on City streams.**

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Enforce the provisions of the City's Chesapeake Bay Preservation Ordinance (CBPO) and Erosion and Sediment Control Ordinance to ensure that they continue to be effective stormwater quality management tools.	The City's CBPO is currently enforced through the Planning and Zoning Divisions and through the work of the Chesapeake Bay Interdisciplinary Review Team (CBIRT). The Ordinance is designed to protect the overall quality of the City's water resources and the health of the Chesapeake Bay as it relates to existing and new development. Continuing enforcement of the CBPO will ensure that the City's water resources and the Chesapeake Bay are not impaired as a result of new development within Falls Church.	Support the work of CBIRT and improve communication among the Planning, Zoning, and Environmental Services Staff.	Planning, Zoning, and Department of Environmental Services
B. Review and amend if necessary, the City's other water quality related ordinances and policies to ensure that they support the City's water quality objectives.	The City's Zoning, Subdivision, Solid Waste, and Erosion and Sediment Control Ordinances should be reviewed to make sure that the goals and strategies of this Comprehensive Plan are met within the associated regulations. This includes possible water quality improvement policies, incentives, and staff support for small development projects.	Continue the review of these ordinances and develop plans for water quality improvements for projects that are less than 2,500 square feet of land disturbance.  Recommend options for funding mechanisms to pay for these improvements.	Planning, Zoning, and Department of Environmental Services
C. Increase vegetative buffer areas along streams on public and private lands.	Vegetative buffers along streambanks are very important to filter out non-source pollution that stems from existing development. The Chesapeake Bay Ordinance regulations require the protection and reestablishment of the buffer area. Stream frontage on public and private lands should be vegetated as much as possible. In the case of such land that is in the floodplain, the possible expansion of the floodplain must be considered and balanced with the need for the vegetative buffer.	Review buffer areas on city-owned land to discern if additional vegetation could be added and if so, try to link them together with other buffer areas.  Require the preservation and reestablishment of the buffer area within the RPA on public lands when applications for land disturbance are submitted.	Planning Division, Recreation and Parks Division, and Department of Environmental Services
D. Daylight portions of piped streams on public property.	The majority of the City's natural streams have been piped over many years to make land more developable and to prevent flooding in areas that have been developed. It has been shown that water quality is negatively impacted by enclosing portions of the stream due to the lack of light, vegetation, and air.	Review the locations of piped streams on public property.  Create a prioritized list of stream segments that would be feasible to daylight.  Seek funding for these projects through the CIP and through grant monies.	Planning Division, Recreation and Parks Department, and Department of Environmental Services
E. Educate citizens, including school children and businesses about watershed protection measures.	It is critical that residents and businesses understand the impacts of their daily actions and larger activities on the watershed.	Educate citizens through the development of brochures, seminars, presentations to school children, through cable television advertisements, and through the City's website.	Planning Division and Department of Environmental Services

Strategies	Explanation	Required Actions	Responsible Party(ies)
F. Inhibit the drainage of pollutants and sediments from construction sites into stream systems.	<p>When a development project is under construction and the land is being graded, exposed soil is particularly susceptible to erosion. Excessive soil that is washed into local streams during storms, clogs the waterway with sediments. Sediment is harmful to water quality because it smothers benthic lifeforms and frequently carries nutrients, that may result in oxygen-depleting algae blooms. The grading of a site or the movement of large quantities of earth can also damage vegetation and wildlife habitat.</p> <p>Development on sensitive lands may also have long-term negative effects on water quality if appropriate engineering techniques are not applied during the development process. For instance, the protection of critical areas adjacent to streams is very important to protect during the construction phase and afterwards.</p>	<p>Require the use of BMPs and environmentally sensitive engineering practices to mitigate the negative impacts of construction. Some examples of these techniques are the use of sedimentation ponds, siltation fences, covering soil piles, and creating filtration around stormwater inlets to prevent silt-laden runoff from reaching local streams.</p> <p>Offer incentives for persons who are disturbing less than 2,500 square feet of development to use low impact development techniques and water quality protection mechanisms during construction. The City could offer free consultation on these matters and perhaps provide silt protection fencing and other materials to property owners.</p>	Planning Division and Department of Environmental Services
G. Continue to work with applicants during the development review process to minimize impervious surface areas and to mitigate the effects of runoff from impervious areas post-construction.	<p>Increased impervious surface area resulting from development increases both the volume and velocity of runoff entering local streams. Impervious surfaces, such as roads and driveways, also collect oil and other toxic substances that are flushed directly into local streams without the benefit of filtration through vegetation or soil. Site design can reduce the total amount of imperviousness on sites and careful preservation or reestablishment of vegetation can help mitigate the effects of increased imperviousness by providing areas that absorb increased water flow.</p> <p>A variety of alternative pervious surfaces are now available that allow rainwater to seep into the ground.</p> <p>Impervious area is regulated through the Chesapeake Bay Ordinance and can be restricted and mitigated using that tool.</p>	<p>Encourage the use of permeable surfaces instead of impermeable surfaces during the development or redevelopment process, particularly in parking and driveway areas.</p> <p>Encourage taller buildings with smaller footprints that preserve more open space whenever possible.</p> <p>Encourage other water quality techniques such as cisterns, rain gardens, rooftop gardens, as well as a variety of structural BMPs to allow for as much stormwater infiltration on the site as possible and improve the quality of stormwater being released into streams.</p>	Planning Division and Department of Environmental Services
H. Ensure that all City –initiated projects are constructed using low impact development techniques and other best management practices (BMPs).	The City should become a model for environmentally friendly development and construction practices in future projects.	Research and adopt various low impact development standards for all city-initiated projects.	Planning Division, Department of Environmental Services, and School staff
I. Restore water quality in Four Mile Run to "Swimmable and Fishable" standards.	Many of the strategies and actions above are designed to improve water quality in all of the City's streams. This is a more specific goal to meet certain standards.	Implement all actions in this plan related to stormwater management and low impact development techniques.	

**GOAL 3. Ensure the adequacy of the City's present and future stormwater management and drainage systems, while emphasizing the need to protect water quality.**

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Design stormwater management structures and bioretention areas to control flooding, protect water quality, and provide for associated vegetative buffers.	<p>Development often requires changes in topography and an overall increase in the imperviousness of a site. These changes can increase the volume and velocity of stormwater runoff, may cause erosion, and may create downstream flooding and reductions in water quality. The City's stormwater control regulations are designed to protect downstream areas from excessive volumes.</p> <p>Stormwater quantity management structures are often constructed as a result of stormwater management regulations to control flooding. However, these structures are often not designed to protect water quality. With relatively simple and incrementally inexpensive design modifications, these structures may serve the dual purpose of water quantity control and water quality protection.</p> <p>Bioretention areas can be even more effective at water quality protection than structural devices. They are also usually less costly to create.</p>	<p>Encourage public and private developers to construct flood control devices that also incorporate water quality protection.</p> <p>Encourage the provision of associated vegetated buffers on development sites.</p> <p>Continue requiring stormwater management devices on all redevelopment sites that require grading plans.</p>	Department of Environmental Services and Planning Division
B. Update and consider the adoption of, and implement the City's Watershed Management Master Plan and the Four Mile Run Watershed Joint Planning Commission recommendations found in its 1998 Final Report, to serve existing and future demands while protecting streams from degradation.	<p>The Watershed Management Master Plan provides specific guidance for the protection of the City's watersheds and streams through a variety of activities.</p> <p>The Final Report of this joint Committee makes numerous recommendations for improving the quality and quantity of water in Four Mile Run.</p>	<p>Work on multi-jurisdictional efforts to manage and protect watersheds.</p> <p>Update the 1996 plan with recent legislative and program changes.</p> <p>Utilize more efficient streetsweeping equipment to vacuum finer particulate matter.</p> <p>Continue to implement the City's streetsweeping contract that provides designated times for sweeping, particularly after snow events and large rain events to remove salt, sand, and sediment from the roadways.</p> <p>Convert to a less toxic form of road deicing materials.</p> <p>Recreate a revegetated buffer area along the stream.</p> <p>Install filters in the City's sediment traps and outfalls where appropriate and create other citywide BMPs.</p> <p>Develop a water quality monitoring program for the City's streams either on a volunteer or contract basis to take baseline and on-going quarterly samples.</p> <p>Continue to educate the public about water quality issues through brochures, seminars, and web information.</p>	Department of Environmental Services



Strategies	Explanation	Required Actions	Responsible Party(ies)
C. Review City stormwater management practices and recommend improvements to the existing system that will improve water quality.	A variety of improvements to the City's stormwater system could improve water quality, for example, installing systems that could filter the water prior to its entrance into local waterways.	Develop recommendations for improvements.  Recommend options for funding mechanisms to pay for these improvements.	Department of Environmental Services and Planning Division
D. Design water quality improvement and stormwater control demonstration projects for public properties.	Whenever the City has the opportunity to create such demonstration projects during public building construction or renovation, it should consider a variety of measures. A Chesapeake Bay Grant has been received for funds to create a demonstration project in the City Hall rear public vehicle parking area and at the Property Yard. It will consist of rainwater catchment cisterns, several raingardens, and a stormwater filtration system.	Consider including cisterns with viewable collection systems, sand filters in stormwater collection devices in roadways and parking lots, green roofs, rain gardens, opportunities to daylight small portions of stormwater pipes prior to the entrance to streams, and other best management practices.	Department of Environmental Services and Planning Division
E. Provide technical assistance to residents and commercial property owners to implement water quality improvement and stormwater control devices on their properties.	Obtaining knowledge about water quality improvement devices and techniques can be difficult. If the staff could be more proactive in working with people who are required to make these changes or who voluntarily want to make these changes, the City could achieve a lot of small water quality improvements.	Seek an additional staff person, possibly through a grant-funded position, to have the capability of encouraging and working with individual homeowners and business owners to design stormwater improvement features on their properties, including cisterns, rain gardens, and green roofs.	Department of Environmental Services and Planning Division
F. Continue to require a strong maintenance program for public and private Best Management Practices (BMPs) to ensure the long-range effectiveness of water quality facilities.	The use of BMPs to protect water quality is a vital component of the City's Chesapeake Bay program. However, BMPs require appropriate maintenance in order to remain effective and may even become counter productive if proper maintenance is not carried out. Under the City's CBPO, a developer is required to sign a BMP maintenance agreement with the City. This goal is also part of the requirements of the City's NPDES Program.	Strengthen the language in the City's standard maintenance agreements.  Devise a system to ensure that BMPs are being inspected for maintenance annually or semi-annually.  Consider requiring written proof of BMP maintenance.  Consider providing a city contractor to maintain BMPs and be reimbursed by the property owners.	Department of Environmental Services
G. Encourage developers, landowners, the City, and neighboring jurisdictions to use cooperative stormwater control measures during development which will increase the opportunities for regional stormwater management solutions.	Most of the future development within the City will occur as a result of scattered infill or modest redevelopment. It has been documented that the use of a few larger Best Management Practice (BMP) facilities to protect water quality is more effective and less expensive to build and maintain than many smaller BMP facilities. Therefore, private and public developers should seek to utilize shared stormwater management facilities that serve more than one development. Regional BMPs may also serve to retrofit existing development that is not currently served by BMP facilities.	Work with private developers and neighboring Fairfax and Arlington Counties to facilitate the use of regional BMP facilities which may serve a large number of developments in a cost-effective manner.	Department of Environmental Services

**GOAL 4. Protect as much existing vegetation and plant as much new native vegetation as possible.**

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Retain and protect mature trees on public properties, and continue to implement tree planting, replacement, and maintenance programs for public rights-of-way, easements, school grounds, and other municipally owned property at a rate that maintains or increases current tree coverage.	The City's Tree, Shrub, and Weed Ordinance and the City's Chesapeake Bay Ordinance guide tree preservation as it relates to development. The regulations within these Ordinances should be implemented to retain as many mature trees and replant as many appropriate tree replacements as possible during the site plan process. Tree planting and maintenance programs within public areas have been ongoing for years and should be continued in order to assure that a greater number of trees are planted each year than are removed.	Encourage the preservation and planting of native trees, shrubs, wildflowers, and groundcovers.  Support the work of the Neighborhood Tree Program.	City Arborist, Planning Division, and Department of Environmental Services
B. Encourage private property owners to retain and protect mature trees on lots that are undergoing construction, and to continue tree planting, replacement, and maintenance programs.	Private property owners do not always have knowledge about the benefits of protecting mature trees both to their own property and to the environment. The City should establish an awareness campaign to explain how trees can be protected, maintained, and sometimes replaced. This campaign should promote the planting of a diversity of native trees and shrubs that can survive in the City's current conditions. A series of brochures have been developed by the City Arborist and other groups to begin this process.	Develop a brochure, possibly a video, and offer a seminar to teach citizens about the impacts of additions and other development projects on trees, the benefits of planting native plant species on their properties, and tree maintenance.  Also place this information on the City's website.	City Arborist and Department of Environmental Services
C. Encourage tree protection and replacement, as well as the removal of exotic invasive species, as part of the development process, and encourage site layout and design techniques to protect significant trees, streams, and other natural features.	During the development process trees and native plants are often removed to make room for construction machinery and new structures. Proper site design will minimize the number of existing trees or specific significant trees or native plants that need to be removed.  The City's Tree, Shrub, and Weed Ordinance and the City's Chesapeake Bay Ordinance requires the protection of existing trees, the replacement of those destroyed or damaged during the development process, and the creation of landscape buffers between the subject and adjacent sites. The Chesapeake Bay Ordinance also allows staff to make recommendations about site layout and design techniques to reduce impervious surface and protect natural features.	Continue to enforce the Tree, Shrub, and Weed and Chesapeake Bay Ordinances.  Create a tree bank, as identified in the Chesapeake Bay Ordinance, to allow property owners who cannot place replacement trees on their properties due to physical site constraints, to contribute to a fund for trees to be used elsewhere.  Obtain easements for new street trees on sites going through the development process.	Planning Division/City Arborist and Department of Environmental Services
D. Develop an Urban Forestry Strategic Plan that would address short and long term visions of how the urban forest should be managed.	This plan would involve an inventory of the resource base, development goals and objectives, specific programs to meet goals and objectives and a periodic assessment of the entire management plan. An inventory of all public trees has been completed.	Begin an outline of the goals and strategies for such a plan.	Planning Division/City Arborist

Strategies	Explanation	Required Actions	Responsible Party(ies)
E. Increase vegetative cover and tree canopy on rooftops and in parking areas to provide shade and reduce impervious surfaces.	Any new development or redevelopment that occurs within the City should be encouraged to include significant landscaping within parking areas to make them more attractive and provide shade to motorists and pedestrians.	Continue to require this type of landscaping as required by the City's zoning ordinance and landscaping ordinance.	Planning Division/City Arborist
F. Encourage citizens to nominate trees as candidates for the City's specimen, memorial, and historic tree programs.	Through a small public relations campaign the City could educate the public about identifying specimen, memorial, and historic trees and encourage persons to make nominations.	Develop a brochure to educate citizens about potential specimen trees. Place this information on the City's website.	Planning Division/City Arborist
G. Inform citizens about the problems associated with invasive plants and encourage the planting of native species.	Many citizens are not aware of the problems associated with cultivating and not properly managing invasive species on their properties. People often plant bamboo, English ivy, and honeysuckle, for example without understanding the repercussions of these actions. An educational campaign could lead to reductions in invasive plant cover throughout the City and could increase the amount of native plant cover.	Develop a brochure to educate citizens about invasives and natives. Place this information on the City's website. Conduct field classes on the identification and management of invasive species and the benefits of planting native species.	Planning Division/City Arborist

***GOAL 5. Preserve and maintain existing parkland and open space, and pursue possibilities for the creation of additional open space for vegetative cover, water infiltration, and wildlife habitat.***

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Utilize floodplains and Chesapeake Bay Preservation Areas, where feasible, for parks and open space activities.	Both floodplains and Chesapeake Bay Preservation Areas (CBPAs) have intrinsic water quality value that warrants protection from inappropriate development and activities. However, these areas are ideal for low intensity recreational activities or as open space. Where appropriate and feasible, the City should utilize these natural areas as parks or open space.	Consider the purchase of other land that is in the floodplain as it becomes available.	City Manager, Recreation and Parks Department
B. Pursue opportunities with land conservation agencies to purchase and preserve open space in the City.	Many conservation agencies provide funding in the form of grants for the purpose of protecting or purchasing open space for public use.	Identify and prioritize open space and pursue funding from conservation agencies to preserve these properties.	City Manager, Recreation and Parks Department
C. Encourage developers and builders to dedicate land, particularly that which is densely vegetated, for open space within their developments.	Some amount of open space should be created in each development project and public open space is preferable to private open space.	Pursue the transfer of remaining or unusable open space, such as floodplain, to the City to be used as public open space or parkland.	City Manager and Recreation and Parks Department

**GOAL 6. Control pollution and environmental hazards, and conserve energy and other natural resources in both the public and private sectors.**

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Develop a mechanism for monitoring stream water quality on a regular basis in order to develop a base line and to pinpoint areas of concern or "hot spots" that need to be targeted for pollution prevention or source control programs. Support the expansion of the NVRC Four Mile Run Management Program to include more water quality monitoring and modeling.	Water quality within the City's portion of Four Mile Run is monitored and modeled by the Northern Virginia Regional Commission. Water quality within the City's portion of Tripps Run is not currently monitored, although the Fairfax County Health Department monitors water quality on Cameron Run (into which Tripps Run drains) to the north of Lake Barcroft. The City of Falls Church should work with NVRC and private organizations to continue water quality monitoring in Four Mile Run and should work with private organizations to initiate a regular program for monitoring Tripps Run.	Create a water quality monitoring program to collect baseline and on-going data for the City's streams.  Use the information collected to assemble a list of "hot spots" that may need to be targeted for pollution prevention programs.	Planning Division and Department of Environmental Services
B. Identify pollution sources and enforce prohibitions on the disposal of unsafe materials in the City's streams.	The City is aware of some existing pollution sources, and it should develop a protocol for identifying and reporting to the proper authorities additional sources of pollution. The City department that receives calls about the disposal of unsafe materials in its streams is the Fire Department.	Establish a protocol between the Fire Department and other City departments to initiate appropriate action, including targeting pollution prevention programs.	
C. Continue to educate citizens and businesses on proper disposal of hazardous materials, such as paint, pesticides, and petroleum products.	The incorrect disposal of household and business-related hazardous materials can create a variety of environmental problems. This behavior is often related to a lack of knowledge about proper disposal practices.	Continue to expand upon City education programs that address the disposal of hazardous materials.	
D. Protect the City's groundwater quality by working with the Virginia Department of Environmental Quality's (DEQ) Water Division to identify leaking underground storage tanks. Work with the DEQ to prevent underground spills in high risk areas.	Underground storage tanks often pose a greater threat than other sources of pollution, because a leak or spill may not be readily detected. After pollution from underground storage tanks enters the groundwater it is often cost-prohibitive to clean it up. Underground storage tanks are regulated by the Department of Environmental Quality's Water Division and are subject to monitoring to detect any leakage. In older urban areas such as Falls Church, there may be underground storage tanks that were installed before stringent regulations were instituted. The location and condition of these tanks are often unknown.  In addition to underground storage tanks, above ground storage tanks, usually containing heating oil for residential use, may pose a hazard to groundwater if not properly managed. Most residential above ground fuel oil tanks are not currently regulated by the State.	Work with the State to assure that leaks are detected and mitigated as soon as possible, and to identify abandoned underground storage tanks which are not currently tracked.  Establish an educational program that encourages owners to inspect their tanks for leaks, ensure that they are sturdy, and have the capacity of the tank and the filling cap location clearly marked.	Department of Environmental Services

Strategies	Explanation	Required Actions	Responsible Party(ies)
E. Encourage regional solutions when the use of joint resources are cost effective to address air and water pollution, as well as other environmental issues.	Many environmental concerns such as air pollution, water pollution and acid rain are regional in scope and are most efficiently addressed on a regional or state-wide basis. The City participates in regional affairs through membership on the Metropolitan Washington Council of Governments and the Northern Virginia Regional Commission, and works closely with state regulatory agencies.	Continue to work with and seek guidance from regional experts through MWCOG and NVRC to help solve these mutual concerns in a collective manner.	Department of Environmental Services
F. Expand the City's integrated pollution prevention program, including water conservation and animal waste control measures, to reduce the introduction of pollutants to City streams.	The City has a variety of policies and programs related to pollution prevention, including a recycling program; hazardous waste collection campaigns; City special pick-ups for furniture and trash that might otherwise be dumped; a yard waste collection, composting, and free mulch program; oil recycling drop-off sites; and enforcement of the City's animal waste clean-up law. In addition to these activities, the City's Environmental programs Specialist and Environmental sponsor an extensive public education program that teaches litter prevention, resource conservation, and recycling through public access cable television, school programs, and free City publications. The Council has also begun several programs including the "Adopt-a-Block" recycling promotion program and a monthly City walk/clean-up. The Village Society has sponsored best management practices workshops on Four Mile Run, the "Adopt-a-Stream Month" program, and the annual Arbor Day tree planting and other requirements for the national designation of "Tree City, U.S.A."	Good communication among these participants must be ensured to make sure that the City's overall pollution prevention goals are being met.  Use water quality monitoring to indicate where sources of water pollution might be most prominent and where they can be targeted for pollution control.	
G. Promote green building and low impact development within the City.	The City is currently working with developers on creating projects that reduce impact on water quality through the Chesapeake Bay Ordinance regulations. However, there is no program to promote other energy conservation and resource use reduction green building techniques such as those outlined in the LEED criteria.	Develop a green building program for commercial and residential construction with incentives.	Planning Division and Department of Environmental Services
H. Improve energy efficiency and reduce emissions through changes in the City's transportation fleet.	The City is currently not operating any alternative fuel vehicles and should consider that option as well as other options for reducing fuel consumption and reducing air pollution.	Prepare a plan for replacing existing City vehicles with more energy efficient vehicles that also create fewer emissions.  Prepare a plan for reducing emissions from other City operations, such as grass cutting, on "Code Red" air quality days.	Department of Environmental Services and City Manager

**GOAL 7. Educate and involve residents in environmental protection activities.**

Strategies	Explanation	Required Actions	Responsible Party(ies)
A. Work with and support citizen and business groups to implement environmentally beneficial projects. Identify financial and volunteer resources for environmental projects, such as the restoration of denuded riparian areas, the publication of homeowners' manuals for back yard programs, or stenciling of storm drains.	Citizen and business groups are the backbone of the City's pollution prevention efforts and are encouraged to sponsor their own environmental improvement projects. Scout troops, neighborhood associations and other civic groups often sponsor clean-up efforts and storm drain stenciling. Homeowners can also do a tremendous amount towards environmental improvement in their own backyards, including composting, improved gardening practices, and the reduced dependency on pesticides and fertilizers.	Continue to support the neighborhood Tree Program and other similar environmental program.	Department of Environmental Services and Planning Division
B. Use municipally owned land as a model for business and citizens for the protection and restoration of natural resources using the most environmentally sensitive techniques.	One of the best ways that the City can promote the protection of natural resources is through its own practices on publicly owned property. Businesses and citizens can learn about subjects like tree maintenance, organic gardening, backyard composting, and stream restoration.	Utilize organic gardening and composting principles for public landscaping and display the information in key places.  Initiate stream restoration projects and display the information to the public at the site in question.	Planning Division/Arborist and Department of Environmental Services